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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/563,868 | 01/09/2006 | Hitoshi Okazaki | 396.45781X00 | 5301 |
| 20457 7590 01/09/2008 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873 | | | EXAMINER EOFF, ANCA | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/563,868 | Applicant(s) OKAZAKI ET AL. | |
| | Examiner Anca Eoff | Art Unit 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 15-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-13 and 15-27 are pending in the application. Claim 14 is canceled.
2. The foreign priority documents JP 2003-288288, filed on August 6, 2003 and JP 2004-029979, filed on February 05, 2004 were received and acknowledged. However, in order to benefit of the earlier filing dates, certified English translations are required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

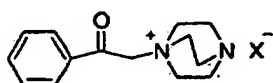
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-9, 15- 20 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amagai et al. (US Patent 5,807,975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glycidyl methacrylate)").

With regard to claim 1, Amagai et al. (US Patent 5,807,975) disclose alkyl sulfide type episulfide compounds with thiirane rings (see formula (I) in column 3). These compounds can be polymerized/cured in the presence of a curing catalyst to prepare an optical material. In this polymerization, any of the known curing catalysts for epoxy resins can be used (column 9, lines 51-57).

However, Amagai et al. fail to disclose the photobase generators of formula (1) in claim 1 of the instant application used for the polymerization/curing of the episulfide compounds.

Tachi et al. disclose a process of curing poly(glycidylmethacrylate) (polymer with epoxy groups) and the use of quaternary ammonium salts of formula (I) as photobase generators:



(I)

where X^- is dimethyldithiocarbamate, Br^- , Ph_4B^- (tetraphenylborate), SCN^- (thiocyanate), F_4B^- (tetrafluoroborate) (page 1331, figure 1).

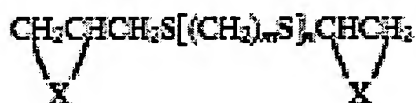
The quaternary ammonium salts of formula (I) meet the limitations for the photobase generator of formula (1) in claim 1 of the instant application, where Ar is phenyl, R is hydrogen and A^+ is 1,4-diazobicyclo (2.2.2) octane.

The quaternary ammonium salt represented by formula (I), where X^- is a dimethyldithiocarbamate anion is good photobase generator and acts as effective photoinitiated thermal crosslinker for poly(glycidylmethacrylate) films (page 1341, Summary). Also, the quaternary ammonium salt of formula (I), where X^- is a tetraphenylborate anion produces the photochemical insolubilization of poly(glycidylmethacrylate) (page 1340).

Therefore, it would have been obvious for one of ordinary skill in the art to use the quaternary ammonium salts disclosed by Tachi et al. as curing catalysts/photobase generators for the episulfide compounds with thiirane rings of Amagai et al., based on

With regard to claims 2 and 3, Tachi et al. disclose the photobase generators of formula (I) above and these photobase generators meet the limitations of claims 2 and 3 because Ar is an unsubstituted phenyl and the anion X⁻ can be a borate compound, such as Ph₄B⁻ or F₄B⁻ (figure 1 on page 1331).

Amagai et al. disclose that the alkyl sulfide type episulfide compounds have the general formula :



Amagai et al. specifically disclose preferred compounds with $X=S$, n is an integer of 0 to 2 and m is an integer of 2 to 4 (column 4, lines 23-60).

$$\text{CH}_2 \text{---} \text{CHCH}_2\text{SCH}_2\text{CHCH}_2$$

Amagai et al. teach that values of n,m above 4 deteriorate the heat resistance and the refractive index of the optical material obtained by curing/polymerization (column 3, lines 63 – column 4, line 3).

With regard to claim 7, Tachi et al. further disclose that the quaternary ammonium salt of formula (I) with N,N-dimethyldithiocarbamate anion is soluble in organic solvents such as water, alcohols, THF (tetrahydrofuran), chloroform and DMF (page 1341, Summary). Tachi et al. further disclose a curing process of poly(glycidylmethacrylate) using quaternary ammonium salts of formula (I) as curing catalyst/photobase generator, the curing process taking place in THF or chloroform (page 1335).

With regard to claims 8 and 15-17, Amagai et al. teach that the episulfide compounds can be polymerized/cured in the presence of a curing catalyst to prepare an optical material. In this polymerization, any of the known curing catalysts for epoxy resins can be used (column 9, lines 51-57). Amagai et al. fail to disclose a method of curing using UV rays.

Tachi et al. disclose a process of curing of poly(glycidylmethacrylate) using quaternary ammonium salts of formula (I) as curing catalyst/photobase generator to form an insoluble film, said curing process taking place in THF or chloroform with 254 nm. radiation (page 1339 and page 1340).

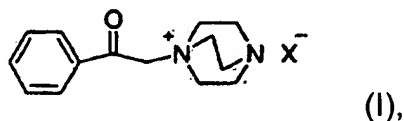
Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to use the quaternary ammonium salts disclosed by Tachi et al. as curing catalysts/photobase generators for the episulfide compounds with thiirane rings of Amagai et al. in a process of curing with UV rays, based on Amagai's teachings that any curing catalyst used for epoxy products can be used to cure the episulfide compounds (Amagai et al., column 9, lines 54-56).

With regard to claims 9 and 18-20, Amagai et al. teach that the episulfide compounds can be polymerized/cured in the presence of a curing catalyst to prepare an optical material. In this polymerization, any of the known curing catalysts for epoxy resins can be used (column 9, lines 51-57). Amagai et al. fail to disclose a method of curing in the absence of air

Tachi et al. further disclose that the photodecomposition rate of the photobase generator under N₂ was 5 times faster than that in air. For irradiation in air, unidentified peaks at 2-4 ppm were observed, due to oxidized photoproducts (pages 1337-1338).

While Tachi et al. do not specifically disclose a curing process performed in the absence of air but it would have been obvious to one of ordinary skill in the art at the time of the invention to performed the curing process under N₂ in order to accelerate the photodecomposition of the photobase generator and to avoid the oxidized photoproducts.

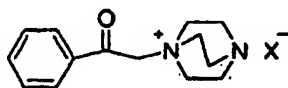
With regard to claim 26, the photo-base generator of Tachi et al. is represented by the formula (I):



wherein X⁻ is N, N dimethyldithiocarbamate, Ph₄B⁻ (tetraphenylborate), SCN⁻ (thiocyanate), F₄B⁻ (tetrafluoroborate) (page 1331, figure 1).

The compound of formula (I), wherein X^- is Ph_4B^- is identical to the photo-base generator disclosed in formula (1) on page 3 and Example 1 in the table on pages 6-9 of the specification of the instant application. Absent a record to prove the contrary, it is the examiner's position that the photo-base generator of formula (I), wherein X^- is Ph_4B^- is capable of generating 1,4-diazabicyclo(2,2,2)octane upon irradiation of ultraviolet rays. (MPEP 2112)

With regard to claim 27, Tachi et al. disclose a process of curing poly(glycidylmethacrylate) and the use of quaternary ammonium salts of formula (I) as photobase generators:



(I)

where X^- is Ph_4B^- (tetraphenylborate), SCN^- (thiocyanate), F_4B^- (tetrafluoroborate) (page 1331, figure 1).

5. Claims 10-13 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amagai et al. (US Patent 5,807,975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glycidyl methacrylate)") as applied to claims 1 and 7 and in further view of Hojo et al. (US Pg-Pub 2003/0129385).

With regard to claims 10 and 21-22, Amagai modified by Tachi teaches the curable composition of claims 1 and 7 above (see paragraph 4 of the Office Action).

Amagai et al. further disclose that an internal/external release agent can be added to the composition for the purpose of improving the mold release characteristics of the cured material from the mold (column 12, lines 30-34) but fail to disclose the presence of a modified silicone oil in the curable composition.

Hojo et al. teach a photocurable resin composition used in the field of optical materials, said resin comprising modified silicone oil as release agent with very high releaseability (par.0148 and par.0150).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to include the modified silicone oil as release agent as disclosed by Hojo et al. in the modified composition of modified Amagai et al., in order to take advantage of the high releaseability properties of the modified silicone oil.

With regard to claim 11, modified Amagai teaches the curable composition of claim 10 above but fails to teach the presence of a silane coupling agent in the curable composition.

Hojo et al. further disclose that a silane coupling agent is added to the photocurable resin in order to improve the heat resistance and adherence (par.0163).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to include the silane coupling agent disclosed by Hojo et al. in the modified composition of modified Amagai et al., in order to improve the heat resistance.

With regard to claims 12, modified Amagai teaches the composition of claim 10 above and Tachi et al. also teach that the curing process takes place under UV irradiation (page 1335 and pages 1339-1340).

With regard to claims 13, modified Amagai teaches the composition of claim 10 above and Tachi et al. further disclose that the photodecomposition rate of the photobase generator under N₂ was 5 times faster than that in air. For irradiation in air, unidentified peaks at 2-4 ppm were observed, due to oxidized photoproducts (pages 1337-1338).

While Tachi et al. do not specifically disclose a curing process performed in the absence of air but it would have been obvious to one of ordinary skill in the art at the time of the invention to performed the curing process under N₂ in order to accelerate the photodecomposition of the photobase generator and to avoid the oxidized photoproducts.

6. Claims 23- 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amagai et al. (US Patent 5,807,975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glicidyl methacrylate)") and Hojo et al. (US Pg-Pub 2003/0129385), as applied to claims 12-13 above and in further view of Ishii et al. (US Pg-Pub 2003/0195270).

Modified Amagai teaches the method of claims 12-13 (see paragraph 5 above) but fails to disclose a coating composition on a surface.

Amagai et al. also teach that the material obtained by polymerizing/curing the episulfides with thiirane rings is desirable as an optical material for lens for spectacles (abstract). The episulfides can provide resinous optical materials having a sufficiently high refractive index and a good balance between the refractive index and the Abbe's number as well as high heat resistance (column 21, lines 36-44).

Ishii et al. teach that materials with high refractive index can be used for optical materials such as spectacle lens, prisms, optical fibers but also as coating layers (par.0002). The above mentioned materials could be injected in a mold and cured, can be applied on substrates such as glass or plastic or interposed between two substrates (par.0119).

It would have been obvious for one of ordinary skill in the art to use the composition of modified Amagai in the process taught by Ishii et al., since the curable composition of modified Amagai et al. has sufficiently high refractive index, good balance between the refractive index and the Abbe's number and high heat resistance (Amagai et al., column 21, lines 36-42).

Response to Arguments

7. Applicant's arguments, filed on November 26, 2007, with respect to the rejection of claims 9 and 18-20 under 35 USC 103 (a) over Amagai et al. (US Patent 5, 807, 975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glicidyl methacrylate)") as applied to claims 1 and 7 and in

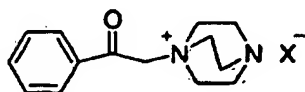
further view of Amagai et al. (US Patent 5,945,504) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of Amagai et al. (US Patent 5, 807, 975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glicidyl methacrylate)")

8. Applicant's arguments, filed on November 26, 2007, with respect to the rejection of claims 10-13 and 21-24 under 35 USC 103 (a) over Amagai et al. (US Patent 5, 807, 975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glicidyl methacrylate)") as applied to claims 1 and 7 and in further view of Torigoe et al. (JP 11-071521) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Amagai et al. (US Patent 5, 807, 975) in view of Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glicidyl methacrylate)") as applied to claims 1 and 7 and in further view of Hojo et al. (US Pg-Pub 2003/0129385)

9. Applicant's arguments filed on November 26, 2007 with regard to claims 1-8 and 15-17 have been fully considered but they are not persuasive, for the reasons stated below:

On pages 13 of the Remarks, the applicant argues that Amagai '975 teaches a polymerization/curing performed at a temperature of 80°C and does not disclose that curing is performed using UV radiation. However, the examiner would like to show that the previous Office Action did not rely on the teachings of Amagai '975 for a curing process with UV radiation but on the teachings of Tachi et al. that the curing of poly(glycidylmethacrylate) using the photobase generator occurs under UV radiation (see paragraph 3 of the previous Office Action and Tachi et al., pages 1339-1340).

On page 13 of the Remarks, the applicant also notes that Tachi et al. ("Photochemical Reactions of Quaternary Ammonium Dithiocarbamates as Photobase Generators and Their Use in the Photoinitiated Thermal Crosslinking of Poly(glycidyl methacrylate)") disclose that quaternary ammonium salts of formula (I):



(I)

where X^- is dimethyldithiocarbamate, Br^- , Ph_4B^- (tetraphenylborate), SCN^- (thiocyanate), F_4B^- (tetrafluoroborate) (page 1331, figure 1) are used as photobase generators for the crosslinking/curing of poly(glycidyl methacrylate).

However, on pages 14-15 of the Remarks the applicant argues that Tachi et al. do not mention at all an optical material and that one of ordinary skill in the art concerned with Amagai '975 would not have looked to the teachings of Tachi et al.

The applicant argues that the episulfide compound of Amagai '975 is quite different from the poly(glycidyl methacrylate) of Tachi et al. from a view point of chemical structure and properties.

While the examiner agrees with the applicant's statement that the episulfide compounds of Amagai '975 are quite different in structure and properties than poly(glycidylmethacrylate) of Tachi et al., the examiner would like to underline that the combination of teachings is not based on similarity of compounds but on the clear teaching of Amagai '975 that any catalyst known for epoxy resins may be used for the polymerization/curing of the alkyl sulfide type episulfide compounds (Amagai '975, column 9, lines 51-57) and on the fact that the photo-base generators of Tachi et al. are used for the curing of poly(glycidyl methacrylate), which is a polymer/resin comprising epoxy groups.

On page 16 of the Remarks, the applicant states that Amagai '975 and Tachi et al. do not suggest the compositions with the anions X^- of claims 3 and 27. However, the examiner would like to point to the fig.1 on page 1331 of Tachi et al. which clearly shows that the anion X^- can be a Ph_4B^- , F_4B^- (borate anions) or SCN^- (thiocyanate anion).

On pages 18-19 of the Remarks, the applicant showing that Ishii et al. comprises Invention 1 (par.0010-0011 and par.0017) and Invention 2 (par.0018-0019). The applicant shows that the examiner relied in the previous Office Action on the disclosure for the Invention 2, which refers to a composition and a method which is not disclosed for Invention 1.

The examiner would like to show that the rejection of the previous Office Action cites only par. 0002 which teaches that materials with high refractive index may be used for spectacle lenses, coating layers, optical filters, etc. and par.0119 which teaches the process of obtaining a coated layer (Invention 2).

Furthermore, the examiner would like to show that Ishii et al. specifically disclose that the cured products of Invention 2 are products with high refractive index (par.0095).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the high-refractive index materials of modified Amagai '975 (Amagai '975, column 21, lines 36-42) for the production of the coating layer of Ishii et al.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AE

